Streptokinase clot culture compared with whole blood culture for isolation of Salmonella typhi and S. paratyphi A from patients with enteric fever

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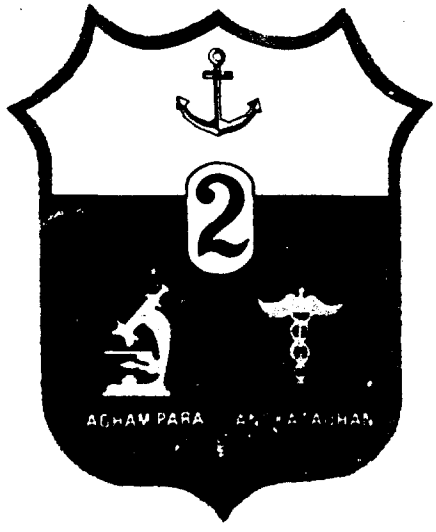

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Streptokinase clot culture compared with whole blood culture for isolation of *Salmonella typhi* and *S. paratyphi* A from patients with enteric fever

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Abstract

The sensitivities of whole blood and clot cultures were compared in 155 patients with typhoid or paratyphoid fever. *Salmonella typhi* or *S. paratyphi* A were isolated from 98·7% of 5 ml 1:10 blood:broth ratio blood cultures and 94·8% of 5 ml streptokinase clot cultures ($P>0·05$). There was no difference in the speed of isolation. Whole blood culture and clot culture were of nearly equal sensitivity in this group of patients.

Introduction

Confirmation of the diagnosis of typhoid and paratyphoid fever requires isolation of the causative organism from a patient. The bone marrow aspirate culture is the single most sensitive method for isolating *Salmonella typhi* and *S. paratyphi* A from patients with enteric fever (Hoffman *et al.*, 1984, 1986; Gilman *et al.*, 1975; Guerra-Caceras *et al.*, 1979; Benavente *et al.*, 1984). However, obtaining bone marrow aspirates is not always possible. Watson (1978) reported that the streptokinase clot culture (STKCC) was 28% more sensitive than whole blood culture (BC), a finding that was not confirmed in Jakarta (Hoffman *et al.*, 1986). This study was designed to compare the sensitivities of STKCC and whole BC for isolating *S. typhi* and *S. paratyphi* A in another location.

Methods

Patient selection

From 27 July 1984 to 8 April 1985, all patients presenting to the inpatient and outpatient departments of Pertamina Oil Company Hospital in Plaju, Sumatera, Indonesia were intended to have 5 ml STKCCs and 5 ml BCs. In some cases specimens for both cultures were not obtained. Only patients from whom specimens for both cultures were obtained, and who had at least one specimen positive for *S. typhi* or *S. paratyphi* A, are included in this report.

Acquisition and processing of specimens

5 ml of blood were placed in 45 ml of 10% Oxgall (Difco Laboratories, Detroit, Michigan, USA) at the bedside (5 ml 1:10 BC) and 5 ml of blood were placed in a sterile tube and allowed to clot at room temperature. Within 24 h (90% within 3 h) the blood was centrifuged for 15 min at 1000 *g*. The serum was removed and the clot was placed in 15 ml of 10% Oxgall with 1500 units of streptokinase (Kabikinase, Pharmacia Laboratories, Piscataway, New Jersey, USA) (5 ml STKCC).

Isolation and biochemical and serological identification of cultured organisms were done according to standard methods described by Edwards & Ewing (1972). Aliquots from the Oxgall were inoculated on to MacConkey's and salmonella-shigella agar media (Difco) daily for several days or until colonies resembling *Salmonella* were cultured. Cultures that did not yield an isolate after 7 d were considered negative and discarded. Colonies resembling *Salmonella* were tested with *Salmonella* group-specific antisera (Bio-Merieux, 69260 Charbonnières les Bains, France). All isolates were sent to Jakarta for confirmation at the National Institute of Health Research and Development and US NAMRU-2 laboratories.

Results

Patient population

155 patients had at least one of the cultures positive for *S. typhi* (93) or *S. paratyphi* A (62). There were 83 males and 72 females with an age of 12·9±8·7 (1-43) years [mean±SD, (range)]. They had been ill for 5·8±3·3 (2-15) d before specimen acquisition and 7·8% had taken an antibiotic before blood was drawn.

Isolation rates

Salmonella sp. was isolated from 5 ml 1:10 BC in 98·7% of cases and from STKCC in 94·8% of cases

Table—Isolation rates of *Salmonella typhi* and *S. paratyphi* A using blood culture and SKTCC among the 155 patients who had at least one positive culture.

Organism	No.	BC[1] positive No.	BC[1] positive %	STKCC[1] positive No.	STKCC[1] positive %
S. typhi	93	92	98·9	89	95·7
S. paratyphi A	62	61	98·4	58	93·5
S. typhi or *S. paratyphi* A	155	153	98·7	147	94·8

[1]BC = 5 ml 1:10 blood:broth ratio whole blood culture, and STKCC = 5 ml streptokinase clot culture.

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($P>0{\cdot}05$, McNemar's test) (Table 1). The BC became positive in $1{\cdot}78\pm0{\cdot}37$ and $1{\cdot}65\pm0{\cdot}87$ d after acquisition and the STKCC in $1{\cdot}82\pm0{\cdot}86$ and $1{\cdot}65\pm0{\cdot}83$ d for *S. typhi* and *S. paratyphi* A respectively.

Discussion

The 5 ml 1:10 BC and STKCC were of nearly equal sensitivity for isolating *S. typhi* and *S. paratyphi* A from patients with typhoid and paratyphoid fever. In Jakarta the 8 ml 1:10 BC was 11% more sensitive than the STKCC. The results of both studies in Indonesia differ markedly from those of WATSON (1978), who showed that the 8 ml STKCC was 28% more sensitive than 8 ml 1:7·5 BC. Watson used bile salt broth and streptokinase/streptodornase (Varidase, Lederle) and we used 10% Oxgall and streptokinase. A series of unpublished experiments in Jakarta has shown that there is no advantage of bile salt broth over Oxgall (M. Lesmana, personal communication). We doubt whether Varidase, which is no longer available, would have been superior to streptokinase. It is possible, but unlikely, that differences in patient populations such as age, pre-culture antibiotic exposure, and pre-culture length of illness could account for the difference.

The STKCC offers the advantage of providing material for culture and serum for serological studies and the disadvantage of being more difficult to process, more expensive and perhaps slightly less sensitive than whole blood culture. When the only source of specimens is clots remaining from blood collected for serological studies, STKCC is an adequate substitute for whole BC.

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